REMARKS

Claims 2, 17, and 19-23 are pending in this application. By this Amendment, claim 2 is amended and claims 21-23 are added. Support for the amendments may be found, for example, in the specification at page 25, line 5 to page 26, line 13, page 32, lines 10-13, page 41, line 24 to page 42, line 4, page 44, lines 13-16 and page 92, lines 1-6, and in the claims as originally filed. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

I. Rejection Under 35 U.S.C. §103

The Office Action rejects claims 2, 17, 19, and 20 under 35 U.S.C. §103(a) as having been obvious over the combination of JP 04-319260 to Watanabe et al. ("Watanabe") and JP 09-147916 to Inoue et al. ("Inoue"). Applicants respectfully traverse the rejection for at least the following reasons.

A. Positive Electrode Active Material Comprising Magnesium

Claim 2 is directed to a positive electrode active material and requires "a lithium cobaltate particle, . . ., wherein the zirconium and magnesium are uniformly dispersed on a surface of the lithium cobaltate particle, . . . at least a part of the magnesium on said surface is present as magnesium oxide." The applied references do not disclose and would not have rendered obvious a lithium cobaltate particle that has magnesium on its surface.

Watanabe discloses a positive electrode active material formed of $LiCoO_2$ to which zirconium is added to improve the cycle properties and high temperature storage properties of a nonaqueous electrolyte secondary battery. See abstract; see also specification at page 2, lines 13-17.[1] Watanabe does not disclose a lithium cobaltate particle that has magnesium on

[1] The Office Action asserts that "Watanabe teaches suspending the particles then forming a paste and then applying the paste to a plate with a rolling technique (paragraph

its surface, much less a lithium cobaltate particle that has magnesium oxide on its surface. The Office Action acknowledges that "Watanabe does not teach magnesium oxide on the surface of the lithium cobaltate [particle]." See page 4.

The Office Action asserts that "it would have been obvious to one having ordinary skill in the art to further provide a layer comprising magnesium oxide on the positive electrode material of Watanabe as taught by Inoue in order to provide a nonaqueous electrolyte secondary battery that achieves high voltages and high cyclability with excellent safety." See page 5. However, Inoue does not disclose a positive electrode active material in which a lithium cobaltate particle has magnesium oxide on its surface.

Inoue discloses a battery where a protective layer is provided on the surface of an electrode plate and this protective layer comprises solid particles and a water-soluble polymer. See paragraphs [0005]-[0008]. Inoue further discloses that the solid particles of the protective layer can be metal oxides, such as MgO and ZrO_2. See paragraph [0008]. The Office Action asserts that "Inoue teaches that the protective layer is on one or both surfaces of an electrode." See page 3; see also Inoue at paragraph [0011]. However, the protective layer disclosed by Inoue is not a positive electrode active material and, thus, is completely irrelevant to the claimed positive electrode active material in which lithium cobaltate particles have magnesium oxide on their surface. That is, Inoue, at paragraph [0011], is not directed to providing metal oxides on the surface of a positive electrode active material. Rather, Inoue, at paragraph [0011], merely teaches how a protective layer--not a positive electrode active material--is made.

[0012])." However, paragraph [0012] of Watanabe, which is directed to forming a cathode using an cathodic active substance, is not relevant to preparing an electrode active material itself. Thus, paragraph [0012] of Watanabe is not relevant to claim 2 in which a positive electrode active material is claimed. Instead, at most, paragraph [0012] would be relevant to preparing an electrode using Watanabe's active material.

With respect to an electrode active material, Inoue only discloses that lithium composite oxide positive active material particles may have SiO_2, SnO_2, Fe_2O_3, and ZnO on their surfaces. See paragraphs [0034]-[0036]. There would not have been any reason or rationale to provide magnesium oxide on the surface of the lithium composite oxide positive active material particles because this is not disclosed by Inoue. Thus, if Watanabe and Inoue are combinable, their combination would not have achieved the claimed positive electrode material in which lithium cobaltate particles have magnesium oxide on their surface. Accordingly, claim features are missing even if the references are combined, and the claim features would not otherwise have been known or rendered obvious by Watanabe and Inoue. Thus, the Office Action has failed to set forth a *prima facie* case of obviousness.

B. Zirconium and Magnesium Existence Ratios

Claim 2 requires that "an existence ratio of zirconium and magnesium is respectively 20% or more." The asserted combination of applied references does not inherently disclose such existence ratios.

Watanabe is completely silent on an existence ratio of zirconium and does not disclose magnesium. Watanabe discloses that the discharge capacity decreases as the amount of zirconium added increases. See paragraph [0018]. Watanabe uses zirconium in amounts from 0 to 10 mol% as shown in Figure 3 to demonstrate the variation of charge-discharge cycles as a function of the amount of zirconium present. However, 10 mol% of zirconium is far less than what is needed to produce an existence ratio of 20% or more on the surface of lithium cobaltate particles.

As discussed above, Inoue does not disclose zirconium or magnesium on the surface of its lithium composite oxide positive active material particles and, thus, is completely silent on zirconium and magnesium existence ratios. Instead, at most, Inoue discloses that 0.1 to 10

wt% of other metal oxides can be added to the surface of its lithium composite oxide positive active material particles. See paragraph [0034].

Thus, if the applied references are combinable, their combination would not have inherently achieved the claimed positive electrode material in which "an existence ratio of zirconium and magnesium is respectively 20% or more." Accordingly, claim features are missing even if the references are combined, and the claim features would not otherwise have been known or rendered obvious by Watanabe and Inoue.

The Office Action also asserts that "[i]t further would have been obvious to optimize the 'existence ratio' of zirconium and magnesium respectively on the surface of the lithium-transition metal oxide of Watanabe as modified by Inoue since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results." See pages 5-6. While a result-effective variable may be optimized through routine experimentation, the Office Action must first establish that a claim feature is a result-effective variable that is subject to such optimization. This requires that the claim feature must first be recognized as a result-effective variable in the art before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation. See MPEP §2144.05(II)(B).

Watanabe and Inoue do not disclose zirconium and magnesium existence ratios and, thus, provide no basis for asserting that such existence ratio are result-effective variables subject to routine optimization. Additionally, the Office Action fails to make any findings of fact to establish that existence ratios are result-effective variables. Thus, the Office Action has failed to establish that zirconium and magnesium existence ratios are subject to optimization through routine experimentation. Accordingly, the Office Action has failed to set forth a *prima facie* case of obviousness. See MPEP §2142 ("The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the

examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.").

C. Evidence of Unexpected Results

The specification provides evidence of unexpected results which is indicative of non-obviousness even though the Office Action has failed to establish *prima facie* obviousness. See MPEP §2142 ("When an applicant submits evidence, whether in the specification as originally filed or in reply to a rejection, the examiner must reconsider the patentability of the claimed invention" (emphasis added)).

Watanabe discloses an electrode active material in which "[z]irconium oxide (ZrO_2) was added to a mixture of Li_2CO_3 and $CoCO_3$ with a 1:1 atomic ratio of Li and Co, and this was baked in air at 900°C for 5 h to produce the cathodic active substance." See paragraph [0010]. The specification describes Comparative Example 1-1 in which lithium carbonate (Li_2CO_3), cobalt tetraoxide (Co_3O_4), and zirconium oxide (ZrO_2) are the starting materials. See page 78, lines 9-17. The specification further discloses that "the starting materials were weighed by a dry method to prepare starting material powder. The obtained starting material powder was calcined in air at 995°C for 7 hours, to thereby obtain a positive electrode active material." Id.

Thus, Comparative Example 1-1 describes an electrode active material that would be identical to that disclosed by Watanabe in all material respects. Because Inoue is not directed to producing an electrode active material in which lithium cobaltate particles have zirconium or magnesium on their surface, modifying Watanabe in view of Inoue would not have changed the electrode active material disclosed by Watanabe and, thus, would not have any effect on the properties of the electrode active material disclosed by Watanabe. Accordingly, Comparative Example 1-1 represents the closest prior art of record and, thus, submitting any

further evidence directed to an electrode active material according to the asserted combination of Watanabe and Inoue would be cumulative and, thus, unnecessary.

It is clear from Comparative Example 1-1 that this electrode active material has a zirconium existence ratio of 12.8% and that zirconium is not uniformly dispersed on the surface of the lithium cobaltate particles. See page 88, line 22 to page 89, line 1. Thus, Comparative Example 1-1 discloses an electrode active material that does not meet each and every claim feature of claim 2. Additionally, this electrode active material is inferior to the claimed positive electrode active material.

This is evidenced by Example 4-1 (zirconium and magnesium) and Example 4-2 (also including aluminum, see new claim 21). Example 4-1 discloses a positive electrode active material having zirconium and magnesium on the surface of the lithium cobaltate particles at existence ratios of 32% and 73%, respectively. See page 82, line 18 to page 83, line 15 and page 91, lines 15-22. The positive electrode active material of Example 4-1 has superior discharge capacity, capacity maintenance ratio, and heating starting temperature. See page 110, Table 5.

Example 4-2 discloses a positive electrode active material having zirconium, magnesium, and aluminum on the surface of the lithium cobaltate particles at existence ratios of 45%, 100%, and 97%, respectively. See page 92, lines 4-6. The positive electrode active material of Example 4-2 has superior load capacity maintenance ratio and heating starting temperature. See page 112, Table 6.

Applicants were able to achieve these unexpected results because when zirconium and magnesium are uniformly present on the surface of the lithium cobaltate particles at an existence ratio of 20% or more, the charge of the lithium-transition metal composite oxide is kept stable when lithium is released by charging and the release of oxygen is suppressed,

thereby stably maintaining the crystal structure during charging to high potentials. See page 24, lines 3-11.

The presence of aluminum in addition to zirconium and magnesium on the particle surface further improves this effect (new claim 21). See page 33, lines 11-19. A similar improved effect is also achieved when titanium is present on the particle surface in addition to zirconium and magnesium (new claim 22). See page 40, lines 19-22. Additionally, a sulfate group on the particle surface in addition to zirconium and magnesium results in improved load characteristics (new claim 23). See page 41, line 24 to page 42, line 4.

Thus, the specification provides evidence that demonstrates that the claimed positive electrode active material achieves unexpected results as compared to the closest art of record, establishing that the claims are patentable over the applied references.

D. Conclusion

For at least the reasons discussed above, Watanabe and Inoue would not have rendered obvious claim 2. Claims 17, 19, and 20 depend from claim 2 and, thus, also would not have been rendered obvious by Watanabe and Inoue for at least the same reasons. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. New Claims

By this Amendment, new claims 21-23 are presented. New claims 21-23 depend from claim 2 and, thus, distinguish over the applied references for at least the reasons discussed above with respect to claim 2. Additionally, claims 21-23 distinguish over the applied references because of the additional features they recite.

Specifically, claim 21 requires that "the surface of the lithium cobaltate particle further comprises aluminum at an existence ratio of 20% or more and at least a part of the aluminum on said surface is present as aluminum oxide" (emphasis added). Claim 22 requires that "the surface of the lithium cobaltate particle further comprises titanium at an

existence ratio of 20% or more and at least a part of the titanium on said surface is present as lithium titanate" (emphasis added). Claim 23 requires that "the surface of the lithium cobaltate particle further comprises a sulfate group" (emphasis added). The applied references do not disclose and would not have rendered obvious these additional claim features.

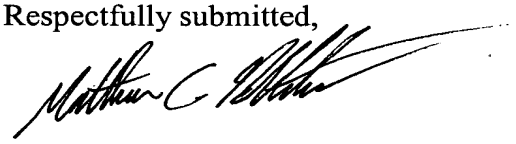
Accordingly, prompt examination and allowance of claims 21-23 are respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of this application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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